Renal Artery Embolization for the Treatment of Refractory Proteinuria in Pediatric Patients with Focal Segmental Glomerulosclerosis

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• No relevant financial relationship reported
Nephrotic syndrome

• Nephrotic range proteinuria: 3 g/day
• Nephrotic syndrome: Nephrotic range proteinuria + Low serum albumin level and Edema
Nephrotic syndrome

**Primary causes of Nephrotic syndrome (NS)**
- Minimal-change nephropathy
- Focal segmental glomerulosclerosis
- Membranous nephropathy
- Hereditary nephropathy

**Secondary causes of Nephrotic syndrome (NS)**
- Diabetes mellitus
- Lupus erythematosus
- Viral infections (hep B, C, HIV)
- Amyloidosis
- Preeclampsia
Complications of Nephrotic syndrome

- Proteinuria
- Edema
- Hypertension
- Hyperlipidemia
- Thrombosis
- Infection
- Acute kidney failure
- End Stage Renal Disease (ESRD)
- Medication adverse effects (steroids, diuretics, albumin)
Focal Segmental Glomerulosclerosis (FSGS)

- 7-10% of pediatric NS
- Minimal change nephropathy: 90% response to steroid treatment
- FSGS: Only 20% achieve remission after initial steroid treatment
- Steroid resistant NS: Immunosuppressant medications other than steroid (cyclosporine, chlorambucil, cyclophosphamide,...)
Steroid-resistant NS

• FSGS is the most common cause of steroid-resistant NS
• More than 60% of failed remission progress to ESRD
• Proteinuria may persist even with dialysis
• Renal artery embolization can be considered as a medical nephrectomy with the purpose of reducing proteinuria
Purpose

• To present our experience of renal artery embolization for the treatment of medical treatment resistant proteinuria in patients with FSGS
Materials and Methods

• Between July 2012 and August 2015
• Four pediatric FSGS patients with medical treatment refractory proteinuria underwent renal artery embolization (RAE)
• Three males and one female
• Ages: 11-15 (mean 13 y/o)
• All RAE: Under general anesthesia
• Embolic agents: Alcohol, Glue, Particles and Coils
Case 1, 13 y/o Male
Living related renal transplantation 4 years ago,
Recurrent FSGS, Proteinuria
Alcohol embolization of the transplanted renal artery
Persistent proteinuria
Transplanted renal artery and native left renal artery alcohol embolization
Urine protein: 1150 mg/dL → 18 mg/dL
Second living related renal transplantation one month later
Case 2, 11 y/o female
On peritoneal dialysis
Hypertension and proteinuria
Glue embolization
Improved hypertension, Anuria
Renal transplantation 3 months later
Case 3, 15 y/o Male
On peritoneal dialysis, Hypertension, Proteinuria
Right renal artery glue embolization
Left renal artery alcohol and coil embolization
Persistent proteinuria
Right renal artery and adrenal collateral coil embolization,
Left renal artery particle embolization
Anuria after second embolization
Case 4, 14 y/o Male
Proteinuria
Right renal artery particle and coil embolization
Persistent proteinuria, medical nephrectomy with indomethacin and enalapril
Currently on peritoneal dialysis
Results

• No acute complications
• All patients are currently alive
• Anuria: n=2 (glue, glue and alcohol)
• Improved proteinuria: n=1 (alcohol)
• Persistent proteinuria: n=1 (particles)
• Two patients had two sessions of RAE
Conclusion

• Renal artery embolization is technically feasible, safe, and effective non-surgical treatment for the FSGS patients with medical treatment resistant proteinuria.